

Appl. No. 10/650,601
Amdt. dated 12/02/2005
Reply to Office Action of 10/04/2005

Attorney Docket No.: TS01-999
N1085-90151

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

1 1. (Currently Amended) A method of providing an intermediate dielectric isolated
2 silicon structure comprising the steps of:

3 forming a trench ~~pattern on~~ in a semiconductor substrate;

4 forming a dielectric layer on the surfaces of said trench ~~pattern~~;

5 forming a heavily doped buried p⁺ layer ~~around~~ surrounding said trench ~~pattern~~
6 after said forming a dielectric layer on the surfaces of said trench;

7 exposing semiconductor surface on the bottom of said trench ~~pattern~~;

8 depositing a silicon film to fill said trench ~~pattern~~;

9 forming buried porous silicon layer around said filled trench ~~pattern~~;

10 oxidizing said buried porous silicon layer and forming a thin oxide over said
11 deposited silicon surface; and

12 forming isolated silicon islands from said deposited silicon.

1 2. (Currently Amended) The method of forming dielectric isolated silicon structure
2 according to claim 1, wherein said dielectric layer is a silicon dioxide liner, formed using
3 at least one of thermal oxidation, low pressure chemical vapor deposition (LPCVD) and
4 plasma enhanced CVD.

1 3. (Currently Amended) The method of forming dielectric isolated silicon structure
2 according to claim 2, wherein said silicon dioxide liner has a thickness [[is]] of
3 approximately between 1000 °A and 2000 °A.

1 4. (Currently Amended) The method of forming dielectric isolated silicon structure
2 according to claim 1, wherein said heavily doped buried p⁺ layer is formed by implanting
3 B⁺ ions with a dose of approximately between 10¹⁵ and 10¹⁶ atom/cm² into said
4 substrate and through said dielectric layer.

Appl. No. 10/650,601
Amdt. dated 12/02/2005
Reply to Office Action of 10/04/2005

Attorney Docket No.: TS01-999
N1085-90151

1 5. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 4, wherein said buried p⁺ layer depth is approximately between 4000 °A and 6000
3 °A.

1 6. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 1, wherein said silicon film filling the trench is selective epitaxial silicon.

1 7. (Previously Presented) The method of forming dielectric isolated silicon structure
2 according to claim 6, wherein, said selective epitaxial film is deposited using methods of
3 at least one of molecular beam epitaxy, low pressure CVD, plasma enhanced CVD, and
4 liquid phase epitaxy.

1 8. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 1, wherein said buried porous silicon layer is formed with anodic etching process
3 comprising:
4 etching bath composition: 10% - 40% HF
5 current density: 10 - 60 mA/cm²

1 9. (Currently Amended) The method of forming dielectric isolated silicon structure
2 according to claim 1, wherein said buried porous silicon layer is oxidized at
3 approximately between 850 and 1050 °C to form an isolating silicon dioxide layer.

1 10. (Previously Presented) The method of forming dielectric isolated silicon structure
2 according to claim 9, wherein said isolating silicon dioxide layer and said dielectric layer
3 have a combined thickness of approximately between 4000 °A and 6000 °A.

1 11. (Previously Presented) The method of forming dielectric isolated silicon structure
2 according to claim 1, wherein said forming isolated silicon islands comprises removing
3 said thin oxide to expose said silicon islands using at least one of chemical mechanical
4 polishing, wet, and plasma etching methods.

Appl. No. 10/650,601
Amdt. dated 12/02/2005
Reply to Office Action of 10/04/2005

Attorney Docket No.: TS01-999
N1085-90151

12. (Previously Presented) A method of forming intermediate silicon dioxide isolated epitaxial silicon structure comprising the steps of:

forming a hard mask stack of silicon dioxide and silicon nitride on a single crystal silicon substrate;

forming a trench pattern in said single crystal silicon substrate;

forming a silicon dioxide layer on the surfaces of said trench pattern;

forming a heavily doped buried p⁺ layer around said trench pattern;

reactive ion etching said silicon dioxide layer on said trench pattern surfaces to expose single crystal silicon at trench bottom, leaving oxide liner on the walls of said trench pattern;

depositing selective epitaxial silicon to fill said trench pattern;

removing said hard mask stack;

forming a resist pattern to fully mask said filled trench;

forming buried porous silicon layer around said filled trench;

oxidizing said buried porous silicon layer and forming a thin oxide over said epitaxial silicon surface; and

forming epitaxial silicon islands by removing said thin oxide layer from top of said epitaxial silicon surface, using at least one of chemical mechanical polishing, wet etching methods, and plasma etching methods.

13. (Original) The method of forming dielectric isolated silicon structure according to claim 12, wherein said silicon dioxide liner thickness is approximately between 1000 Å and 2000 Å.

14. (Original) The method of forming dielectric isolated silicon structure according to claim 12, wherein said heavily doped, buried p⁺ layer is formed by implanting B⁺ ions with a dose of approximately between 10¹⁵ and 10¹⁸ atom/cm².

Appl. No. 10/650,601
Amdt. dated 12/02/2005
Reply to Office Action of 10/04/2005

Attorney Docket No.: TS01-999
N1085-90151

1 15. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 14, wherein said buried p⁺ layer depth is approximately between 4000 Å and
3 6000 Å.

1 16. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 12, wherein said buried porous silicon layer is formed with anodic etching process
3 comprising:
4 etching bath composition: 10% - 40% HF
5 current density: 10 – 60 mA/cm²

1 17. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 12, wherein said buried porous silicon layer is oxidized at approximately between
3 850 and 1050 °C.

1 18. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 17, wherein said isolating silicon dioxide layer has a thickness of approximately
3 between 4000 Å and 6000 Å.

1 19. (Withdrawn) A silicon-dioxide isolated epitaxial silicon structure comprising:
2 epitaxial silicon filled trenches in silicon substrate and
3 isolated buried silicon dioxide layer surrounding said epitaxial silicon islands or
4 regions.

1 20. (Withdrawn) The silicon-dioxide epitaxial silicon structure according to claim 19,
2 wherein said isolating silicon dioxide layer has a thickness of approximately between
3 4000 and 6000 Å.